REMARKS

The present invention provides an improvement over the prior art in providing a mass flow control module as a unitary member that can be easily mounted with a relatively small footprint on the upper surface of a housing block member to improve both accuracy and durability of the instrument.

For example, referring to our Figure 1, a pressure control valve 4, a flow rate sensor 5, and a flow rate control valve 6 are aligned consecutively on an upper side of a fluid passage block 3, to thereby minimize the overall size of the mass flow controller 1. As also can be appreciated, our pressure sensor unit 7 is composed of a first sensor 7a at an inlet entrance of the passage block 3 and a second sensor 7b downstream of our pressure control valve 4. As noted in the third paragraph on Page 7 of our specification, our control unit 8b can control the pressure control valve 4 by a feedback to a specific pressure Pc by using a pressure signal from the pressure sensor 7b. As a result, if the inlet side pressure P1 fluctuates, our mass flow controller can still provide a stable flow.

Additionally, the control unit 8a can control the flow rate control valve 6 by feedback so that the measured flow rate F may conform to a present preset flow rate Fs by using the flow rate signal Fs from the flow rate sensor 5. Therefore, if the outlet side pressure P_2 of the mass flow controller fluctuates, it will not affect s [tp[rt operation of our mass flow controller.

As a result, additional pressure regulators are not required in an upstream mounting of our mass flow controller, and we can secure accurate measurements as a result of our flow rate sensor 5 being relieved from substantial fluctuations in pressure and also having the benefit of an extended service life. See, for example, the first three paragraphs of Page 8 of our specification.

Claims 15-18 are amended.

New Claims 19-24 are presented without the addition of any new subject matter, to expedite our current prosecution.

The Office Action rejected our Claims 15-18 over a combination of the *Ollivier* (U.S. Patent No. 6,363,958) in view of *Redemann et al.* (U.S. Patent No. 6,293,310) and *Moriya et al.* (U.S. Patent No. 5,438,026).

The *Ollivier* reference teaches a flow control system using functional components that are compatible with a 1 1/8 inch wide manifold. Basically, a series of the separate components are collectively used as the mass flow control module 10 in the Office Action to represent the entire system and not simply a unitary component of a mass flow controller.

Reference can be made, for example, to Figure 1B which discloses from right to left, the provision of a pneumatically operated valve 8, a second pneumatically operated valve 14, a capacity and temperature sensor 5, a pressure transducer 6, a pressure regulator 16, a pressure transducer 18, and finally, a pneumatically operated valve 20.

The Office Action considered the "capacity and temperature sensor 5" to be equivalent to our flow rate sensor.

Additionally, the Office Action referred to a mass flow control valve 22, disclosed in the *Ollivier* reference, which is shown in Figure 8 and described in Paragraph 8, Lines 14-17. As can be seen, this mass flow rate control valve 22 is mounted downstream of the actual gas manifold 7 that serves as the mounting base. See Column 6, Lines 27-29.

Applicant respectfully traverses the manner in which these components are contended to be mounted on as the mass flow rate control valve unit (22).

In any event, the Office Action's contention that a flow rate sensor (capacity and temperature sensor 5) is positioned in a manner equivalent to our own flow rate sensor 5, as shown in Figure 1 of our drawings, is not supported by the *Ollivier* reference. The capacity and

temperature sensor 5 does not exist between the control valves 16 and the alleged control valve or flow rate control valve 22. See *Ollivier*, Figure 1A.

It is submitted that this arrangement would result in a significant difference in functional effect and performance, since the *Ollivier* flow rate senor will be directly affected by any fluctuation in the flow rate caused by an upstream pressure fluctuation. Any fluid flowing through the passage must first pass through the sensor 5 and the sensor 5 would then be subject to damage by pressure.

In addition, what the *Ollivier* pressure sensor 18, shown in Figure 1B, senses, is a pressure fluctuation (B) that has been altered from any first pressure fluctuation (A) of fluid passing initially through the sensor 5. The sensor 5 will not experience the same pressure fluctuation (A) directly. In other words, the pressure fluctuation (B) in the passage 1 in the block 7 of *Ollivier*, will not be the same pressure fluctuation (A) that has been generated at an upstream side of the capacity and temperature sensor 5 in the gas flow passage. Rather, a different pressure fluctuation that has changed from the initial pressure fluctuation (A) will occur.

Referring to our invention, shown in the structure of Figure 1, any pressure fluctuation that is detected by our second pressure sensor 7b, is a pressure fluctuation Δ of the inlet side pressure P_1 that apparently has been contended to be the first pressure fluctuation A cited in the Office Action in the *Ollivier* reference. However, the pressure fluctuation B detected by the pressure sensor 18 of the *Ollivier* disclosure, is delayed in comparison with the pressure fluctuation Δ detected by our second pressure sensor 7b.

Accordingly, any combination of *Ollivier* and the secondary references cannot eliminate the effects caused by a first pressure fluctuation (A) even if alleged that they may attempt to address the effects caused by only the pressure fluctuation (B).

Our invention has the capacity of removing any consequences of an initial pressure fluctuation Δ on the inlet side pressure P_1 without the disadvantages in the cited prior art that would be subject to not only a delayed reading, but also inaccurate measurement of pressure fluctuation and the potential of undue stress imposed on the components.

Thus, in referring to Claim 19, it is respectfully submitted that it is not obvious over the cited prior art of record because in that cited prior art of record the capacity and temperature sensor 5 and the pressure control regulator valve 16 are positioning in a spaced relationship on the upstream side.

By comparison, our present invention has a pressure control valve 4 as shown in Figure 1, before our flow rate sensor 5 on the upstream side. Please note that the upstream side is on the right in the *Ollivier* disclosure, while the upstream side is on the left in our drawings, such as Figure 1.

It is respectfully submitted that our dependent claims depending from Claim 19 are further novel and patentable for the above reasons.

Dependent Claim 20 is fully supported in our specification, Pages 8, Lines 9-10, while Claim 21 is supported on Page 8, Lines 16-19, Claim 22 is supported on Page 5, Lines 27-28, Claim 23 is supported on Page 6, Lines 3-5, while Claim 24 is supported on Page 5, Line 12.

Thus, our pressure control valve 4 and our flow rate sensor 5 are arranged adjacent and side by side thereby enabling a second passage in the flow line 2b to be disposed between them with minimal distance. Therefore, any time delay in the pressure Pc with respect to the output of the control signal Pc of the pressure control valve 4 will be minimalized and as a result, any fluctuations of pressure Pc, see Figure 1 of our drawings, in the section of the flow rate sensor 5 will be made as small as possible.

This advantageous effect is not provided in any combination of the references cited of record.

Another difference in functional effect between the present invention, specifically claim 21, and the cited prior art is that in *Ollivier* a first pressure sensor 6 is disposed between the pressure control valve 16 and the flow rate sensor 5. However, the flow rate sensor 5, the pressure sensor 6 and the control valve 16 are disposed in order from the upstream side. Accordingly, this arrangement configuration is different from that of present invention where the pressure control valve 4, the second pressure sensor 7b and the flow rate sensor 5 are disposed in order from the upstream side. Accordingly, the combination of the inventions described in *Ollivier*, *Redemann et al.* and *Moriya et al.* can not provide a pressure Pc with a minimal measurable disturbance. As a result, the control accuracy and stability of flow rate by our unitary mass flow controller 1 can be enhanced.

Moreover, the present invention can eliminate effects caused by pressure fluctuations Δ of the inlet side pressure P_1 and of outlet side pressure P_2 since the present invention has our pressure sensor 7b facing the passage 2b immediately before the flow rate sensor 5 in the integrated passage block 3, and the predetermined pressure Pc can be maintained by using a pressure signal Spb of the pressure sensor 7b. Therefore, our flow rate F can be measured correctly by the flow rate sensor 5 in a state where the pressure Pc is held relatively constant.

As can be appreciated by the cited references of record, this is a very crowded field with a number of skilled engineers attempting to provide improvements, particularly in the manufacturing of semiconductor products. The advantages of our invention, however, provide significant advancements that are not taught in the cited references of record.

> "Thus when differences that may appear technologically minor nonetheless have a practical impact, particularly in a crowded field, the

> decision-maker must consider the obviousness of the new structure in this light."
>
> *Continental Can Co. USA Inc. v. Monsanto Co.*, 20 U.S.P.Q. 2d. 1746, 1752 (Fed. Cir. 1991).

The secondary references were cited for specific features, such as the *Redemann et al.* reference teaching a housing block member with a number of openings on the upper surface to prevent modular mounting of various control members to reduce external piping connections. As can be readily determined from the *Redemann et al.* reference, the features of a "V-shaped channel" that can act as a single gas inlet and a single gas outlet, so the inlet and outlet are on the same plane, represents a principle feature of that reference. The *Redemann et al.* reference does not disclose the unique unitary mass flow controller modular element of our present invention.

Finally, the *Moriya et al.* reference was cited to disclose the position of a filter 24b, c, mounted, shown for example schematically control valve. In Figure 2, the filter position is immediately adjacent the outlet valves 25g and 25d of the gas sources 28 and 29. Regulators 27a and b are positioned before, respectively, the mass flow controller 26 and after the check valve 25c and the mass flow controller 26. As can be seen in Figure 1, these components are within a box housing unit of a gas supply mechanism 22 not integrated as a modular unit for mounting on a fluid flow manifold block.

Thus, in summary, the *Moriya et al.* reference simply discloses a desire to have a filter immediately adjacent the gas supply tanks 28 and 29. There is certainly no teaching of a filter mounted for unitary purposes within a mass flow controller as defined in our present claims.

The Federal Circuit has held that a person of ordinary skill in the art must not only have had some motivation to combine the prior art teachings, but some motivation to combine the prior art teachings in the particular manner claimed. *See, e.g., In re Kotzab*, 217 F.3d 1365, 1371 (Fed. Cir. 2000) ("Particular findings must be made as to the reason the skilled artisan, with no

knowledge of the claimed invention, would have selected these components for combination *in the manner claimed.*" (emphasis added)); *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998) ("In other words, the examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination *in the manner claimed.*" (emphasis added)).

Referring further to our dependent Claim 22, there is no teaching in the *Ollivier* disclosure wherein a pressure control valve 16, the flow rate sensor 5, and the mass flow rate control valve 22 aligned on one side of a passage block. In our present invention, our pressure control valve 4, our flow rate sensor 5, and our flow rate control valve 6 are aligned at one side on the upper side of the passage block 3 and the overall size of our mass flow controller can be minimized. Likewise in dependent claim 23, we position our pressure sensor at a side of the passage block different from the side in which the pressure control valve, the flow rate sensor, and the flow rate control valve are mounted.

Referring to dependent Claim 24, our pressure control valve, our flow rate sensor, and our flow rate control valve are also aligned on one side of a passage block. We provide a fluid flow passage block that is formed integrally which can further assist in the prevention of any gas leak that can be of a significant problem in the manufacturing of semiconductor items due to the highly poisonous and corrosive effect of some of the gasses required in the manufacturing of semiconductor chips.

In summary, the present amended Claim 15 and the newly drafted claims more than adequately distinguish over the references cited of record. None of the references of record teach a unitary mass flow controller that can be mounted on a fluid flow a passage block with an arrangement of the components as defined in our present claims.

It is believed that the amendment to the claims removes the grounds for citing broadly the *Ollivier* as the basic reference to reject our current claims.

If the Examiner has any questions or suggestions with regards to claim language, the undersigned attorney would appreciate a telephone conference in order to expedite the prosecution of the present case.

It is believed the case is now in condition for allowance and early notification of the same is requested.

Very truly yours,

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